

CLAIMS

1. A weatherproof sheet, capable of fixedly and legibly bearing images written or machine printed directly thereon, comprising:

a cellulosic substrate having two substantially planar sides; and

a durable weatherproofing coating layer, impregnantly covering at least one of the sides of the cellulosic substrate, wherein the coating layer comprises a copolymer or mixture of copolymers derived from at least one styrene or styrenic monomer and at least one acrylic monomer, a wax, a filler to provide block resistance, a filler to provide tooth for printability and writability, and a pigment.

2. The weatherproof sheet of claim 1 wherein the copolymer or mixture of copolymers is derived from monomers selected from the group consisting of styrene, butyl acrylate, 2-ethylhexyl acrylate, acrylic acid, and a mixture thereof.

3. The weatherproof sheet of claim 1 wherein the mixture of copolymers is the mixture of copolymers present in Lucidene[®] 605.

4. The weatherproof sheet of claim 1 wherein the weight of the coating layer ranges from about 5.6 grams to about 8.5 grams per square meter of the cellulosic substrate surface area covered.

5. The weatherproof sheet of claim 1 wherein, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight, the amount of the copolymer or mixture of copolymers ranges from about 30 percent to about 63 percent, and the amount of the wax ranges from about 1.5 percent to about 9.5 percent.

6. The weatherproof sheet of claim 1 wherein, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight, the amount of

the copolymer or mixture of copolymers is about 50 percent, and the amount of the wax is about 2.5 percent.

7. The weatherproof sheet of claim 1 wherein the filler to provide block resistance comprises barium sulfate.

8. The weatherproof sheet of claim 7 wherein the amount of the barium sulfate ranges from 0 percent to about 65 percent, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight.

9. The weatherproof sheet of claim 7 wherein the amount of the barium sulfate is about 17 percent, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight.

10. The weatherproof sheet of claim 1 wherein the filler to provide block resistance is clay, mica, aluminum trihydrate, or a mixture thereof.

11. The weatherproof sheet of claim 1 wherein the filler to provide tooth for printability and writability comprises calcium carbonate in an amount ranging from 0 percent to about 16 percent, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight.

12. The weatherproof sheet of claim 1 wherein the pigment comprises titanium dioxide in an amount ranging from 0 percent to about 24 percent, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight.

13. The weatherproof sheet of claim 1, further comprising an additive to enhance the wet strength of the cellulosic substrate.

14. The weatherproof sheet of claim 13 wherein the additive comprises polyamide.

15. The weatherproof sheet of claim 1 wherein the wax is paraffin wax, a polypropylene-wax mixture, a polyethylene-wax mixture, carnauba wax, microcrystalline wax, montan wax, a Fisher-Tropsch wax, beeswax, or a mixture thereof.

16. The weatherproof sheet of claim 1 wherein the coating layer further comprises a color tinting agent comprising an organic or inorganic pigment dispersed in an acrylic resin or other suitable media.

17. The weatherproof sheet of claim 1 wherein the coating layer is derived from Rite in the Rain[®] Formula #22154A.

18. The weatherproof sheet of claim 1 wherein the cellulosic substrate is paper comprising cellulosic fibers.

19. The weatherproof sheet of claim 18, further comprising machine printed images, printed directly onto the coating layer.

20. The weatherproof sheet of claim 19 wherein the machine printed images are printed by means of lithography, screen printing, a letter press, flexography, or rotogravure.

21. The weatherproof sheet of claim 18, further comprising written images, the written images being written directly upon the coating layer by writing with a pencil or all-weather pen while the surface of the coating layer is wet or dry.

22. A book comprising a plurality of the weatherproof sheets of claim 19.

23. A notepad comprising a plurality of the weatherproof sheets of claim 18.

24. A weatherproof sheet suitable for use in a photocopier or laser printer and capable of fixedly and legibly bearing images printed directly thereon by means of the photocopier or laser printer, the weatherproof sheet comprising:

a cellulosic substrate having two substantially planar sides; and

a durable weatherproofing coating layer, impregnantly covering at least one of the two sides of the substrate, wherein the coating layer comprises a copolymer or mixture of copolymers derived from at least one styrene or styrenic monomer and at least one acrylic monomer, a wax, a filler to provide block resistance, a filler to provide tooth for printability and writability, a pigment, and an optical brightener; with the proviso that the coating layer comprises substantially no calcium carbonate filler and substantially no titanium dioxide pigment.

25. The weatherproof sheet of claim 24 wherein the copolymer or mixture of copolymers is derived from monomers selected from the group consisting of styrene, butyl acrylate, 2-ethylhexyl acrylate, acrylic acid, and a mixture thereof.

26. The weatherproof sheet of claim 24 wherein the mixture of copolymers is the mixture of copolymers present in Lucidene®605.

27. The weatherproof sheet of claim 24 wherein the weight of the coating layer ranges from about 3.7 grams to about 5.6 grams per square meter of cellulosic substrate surface area covered.

28. The weatherproof sheet of claim 24 wherein, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight, the amount of the copolymer or mixture of copolymers ranges from about 30 percent to about 82 percent, and the amount of the wax ranges from about 1.5 percent to about 13 percent.

29. The weatherproof sheet of claim 24 wherein, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight, the amount of the copolymer or mixture of copolymers is about 52.5 percent, and the amount of the wax is about 2.7 percent.

30. The weatherproof sheet of claim 24 wherein the filler to provide block resistance comprises barium sulfate, the filler to provide tooth for printability and writability comprises barium sulfate, and the pigment comprises barium sulfate.

31. The weatherproof sheet of claim 30 wherein the amount of the barium sulfate ranges from 0 percent to about 65 percent, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight.

32. The weatherproof sheet of claim 30 wherein the amount of the barium sulfate is about 38 percent, based on the total weight of the coating layer and the coating layer having a moisture content of 5 percent by weight.

33. The weatherproof sheet of claim 24 wherein the filler to provide block resistance is clay, mica, aluminum trihydrate, or a mixture thereof.

34. The weatherproof sheet of claim 24, further comprising an additive to enhance the wet strength of the cellulosic substrate.

35. The weatherproof sheet of claim 34 wherein the additive comprises polyamide.

36. The weatherproof sheet of claim 24 wherein the wax is paraffin wax, a polypropylene-wax mixture, a polyethylene-wax mixture, carnauba wax, microcrystalline wax, montan wax, a Fisher-Tropsch wax, beeswax, or a mixture thereof.

37. The weatherproof sheet of claim 24 wherein the coating layer further comprises a color tinting agent comprising an organic or inorganic pigment dispersed in an acrylic resin or other suitable media.

38. The weatherproof sheet of claim 24 wherein the coating layer further comprises water and wherein the moisture content associated therewith ranges from about 4 percent to about 7 percent by weight of the weatherproof sheet.

39. The weatherproof sheet of claim 24 wherein the coating layer is derived from Clear Rite in the Rain[®] Formula #22560B.

40. The weatherproof sheet of claim 24 wherein the cellulosic substrate is paper comprising cellulosic fibers.

41. The weatherproof sheet of claim 40 wherein the thickness of the paper ranges from .003 inches to .013 inches.

42. The weatherproof sheet of claim 40 wherein the thickness of the paper ranges from about .004 inches to about .006 inches.

43. The weatherproof sheet of claim 42 having dimensions suitable for printing thereon using a photocopier or laser printer so as to produce an architectural or construction drawing.

44. A method of making a weatherproof sheet, capable of fixedly and legibly bearing images written or machine printed directly thereon, comprising the steps of:

providing a cellulosic substrate having two substantially planar sides;

impregnantly applying to at least one of the substantially planar sides of the cellulosic substrate, an aqueous composition that includes an emulsified copolymer or mixture of copolymers

derived from at least one styrene or styrenic monomer and at least one acrylic monomer, an emulsified wax, a filler to provide block resistance, a filler to provide tooth for printability and writability, and a pigment; and

drying the impregnantly applied aqueous composition to remove most of the water in the aqueous composition to thereby form a durably weatherproofing coating layer, impregnantly covering the at least one of the substantially planar sides of the cellosic substrate.

45. The method of claim 44 wherein the emulsified mixture of copolymers is Lucidene[®] 605.

46. The method of claim 44 wherein the amount of the aqueous composition impregnantly applied ranges from about 2.6 pounds to about 3.9 pounds per ream of the cellulosic substrate per side.

47. The method of claim 44 wherein, based on the total weight of the aqueous composition, the amount of the emulsified copolymer or mixture of copolymers ranges from about 40 percent to about 80 percent, and the amount of the emulsified wax ranges from about 3 percent to about 20 percent.

48. The method of claim 44 wherein, based on the total weight of the aqueous composition, the amount of the emulsified copolymer or mixture of copolymers is about 64 percent, and the amount of the emulsified wax is about 5.3 percent.

49. The method of claim 44 wherein the filler to provide block resistance comprises barium sulfate, present in the aqueous composition in an amount ranging from 0 percent to about 40 percent by weight of the aqueous composition.

50. The method of claim 44 wherein the filler to provide tooth for printability and writability comprises calcium carbonate, present in the aqueous composition in an amount ranging from about 0 to about 10 percent by weight of the aqueous composition.

51. The method of claim 44 wherein the pigment comprises titanium dioxide, present in an amount ranging from about 5 percent to about 15 percent by weight of the aqueous composition.

52. The method of claim 44 wherein the aqueous composition is Rite in the Rain[®] Formula #22154A.

53. The method of claim 44 wherein the aqueous composition is impregnantly applied by a method that uses a flexographic process, rotogravure, an air knife, a knife coat, a knife coat, a reverse doctor, a Meyer rod, immersion, spray, or roll nip.

54. The method of claim 44 wherein the drying step is carried out using infrared dryers and air knives so as to yield a weatherproof sheet having a moisture content ranging from about 3 percent to about 10 percent by weight of the weatherproof sheet.

55. A weatherproof sheet, capable of fixedly and legibly bearing images written or machine printed directly thereon, made by the method of claim 44.

56. A method of making a weatherproof sheet suitable for use in a photocopier or laser printer and capable of fixedly and legibly bearing images printed directly thereon by means of the photocopier or laser printer, comprising the steps of:

providing a cellulosic substrate having two substantially planar sides;

impregnantly applying to at least one of the substantially planar sides of the cellulosic substrate an aqueous composition that includes an emulsified copolymer or mixture of copolymers derived from at least one styrene or styrenic monomer and at least one acrylic monomer, and that

further includes an emulsified wax, a filler to provide block resistance, a filler to provide tooth for printability and writability, a pigment, and an optical brightener, with the proviso that the aqueous composition comprises substantially no calcium carbonate filler and substantially no titanium dioxide pigment; and

drying the impregnantly applied aqueous composition to remove most of the water in the aqueous composition to thereby form a durably weatherproofing coating layer, impregnantly covering the at least one of the substantially planar sides of the cellulosic substrate.

57. The method of claim 56 wherein the emulsified mixture of copolymers is Lucidene®605.

58. The method of claim 56 wherein the amount of the aqueous composition impregnantly applied ranges from about 1.7 pounds to about 2.6 pounds per ream of the cellulosic substrate per side.

59. The method of claim 56 wherein, based on the total weight of the aqueous composition, the amount of the emulsified copolymer or mixture of copolymers ranges from about 40 percent to about 80 percent, and the amount of the emulsified wax ranges from about 3 percent to about 20 percent.

60. The method of claim 56 wherein, based on the total weight of the aqueous composition, the amount of the emulsified copolymer or mixture of copolymers is about 67 percent, and the amount of the emulsified wax is about 5.5 percent.

61. The method of claim 56 wherein the filler to provide block resistance comprises barium sulfate, the filler to provide tooth for printability and writability comprises barium sulfate, and the pigment comprises barium sulfate, and wherein the amount of the barium sulfate ranges from 0 percent to about 40 percent, based on the total weight of the aqueous composition.

62. The method of claim 56 wherein the filler to provide block resistance comprises barium sulfate, the filler to provide tooth for printability and writability comprises barium sulfate, and the pigment comprises barium sulfate, and wherein the amount of the barium sulfate is about 23 percent, based on the total weight of the aqueous composition

63. The method of claim 56 wherein the aqueous composition is impregnantly applied by a method that uses a flexographic process, rotogravure, an air knife, a knife coat, a reverse doctor, a Meyer rod, immersion, spray, or roll nip..

64. The method of claim 56 wherein the drying step is carried out using infrared dryers and air knives so as to yield a weatherproof sheet having a moisture content ranging from about 4 percent to about 7 percent by weight of the weatherproof sheet.

65. A weatherproof sheet, suitable for use in a photocopier or laser printer and capable of fixedly and legibly bearing images printed directly thereon by means of the photocopier or laser printer, made by the method of claim 56.